Stoller
Hanford Office

DOE-EM/GJ661-2004

C4231
Log Data Report

Borehole Information:

Borehole: C4231			Site: 216-U-12 Crib		
Coordinates (WA State Plane)		GWL (ft)[1]: Dry		GWL Date: 05/13/2004	
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
Not Available	Not Available	May 2004	Not Available	50	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.0	6 5/8	5 1/2	9/16	0.0	50

Borehole Notes:

Zero reference is the ground surface. Fluor FTL was source of the casing data. This pushhole is located approximately 75 ft northwest of the crib.

Logging Equipment Information:

Logging System:	Gamma 2A		Type: SGLS (35%) 34TP20893A
Calibration Date:	03/2004	Calibration Reference:	DOE-EM/GJ642-2004
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2 / Repeat			
Date	05/13/04	05/13/04			
Logging Engineer	Pearson	Pearson			
Start Depth (ft)	49.5	25.0			
Finish Depth (ft)	0.0	20.0			
Count Time (sec)	200	200			
Live/Real	R	R			
Shield (Y/N)	N	N			
MSA Interval (ft)	1.0	1.0			
ft/min	N/A[3]	N/A			
Pre-Verification	BA332CAB	BA332CAB			
Start File	BA332000	BA332051			
Finish File	BA332050	BA332056			
Post-Verification	BA334CAA	BA334CAA			
Depth Return Error (in.)	½ low	0.0			

Log Run	1	2 / Repeat			
Comments	No gain adjustments.	No gain adjustments.			

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier. The first spectrum (BA332000) was collected at the bottom of the borehole. The tool reached total depth at 49.5 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	5/17/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectrum, as compared to the pre-run verification spectrum, for the day were between 7.7 percent lower and 0.6 percent higher at the end of the day. The peak counts per second at the 1461 keV showed the greatest variation of the KUT photopeaks on the post-run verification spectrum as compared to the pre-run verification spectrum. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The post-run verification spectrum was used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G2AMar04.xls). Zero reference was the ground surface. The casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 49.5 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at the ground surface and 2 ft with concentrations of 0.7 pCi/g and 0.3 pCi/g, respectively.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV.

[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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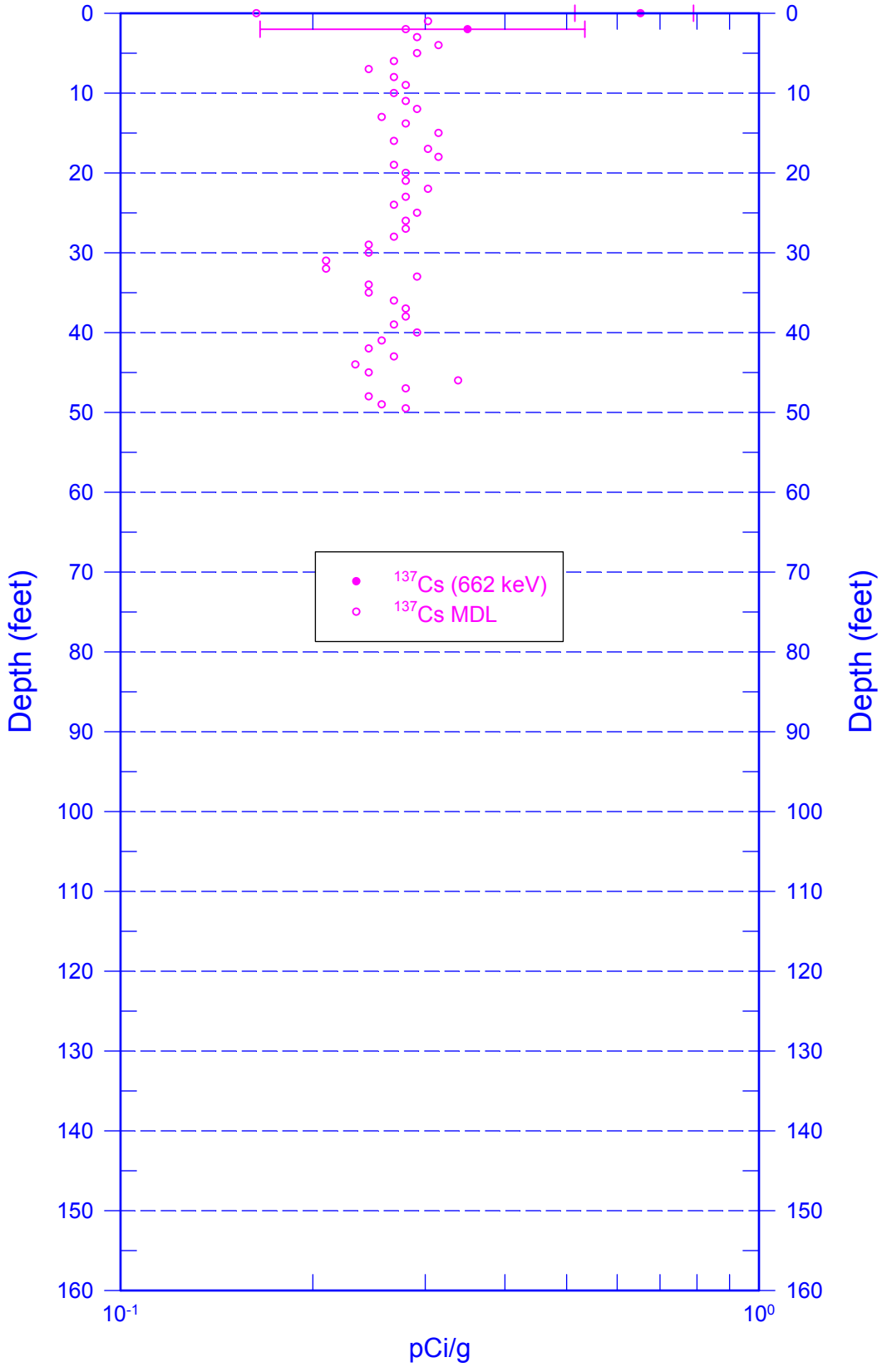
Man-Made Radionuclides



Zero Reference = Ground Surface

Date of Last Logging Run
5/13/2004

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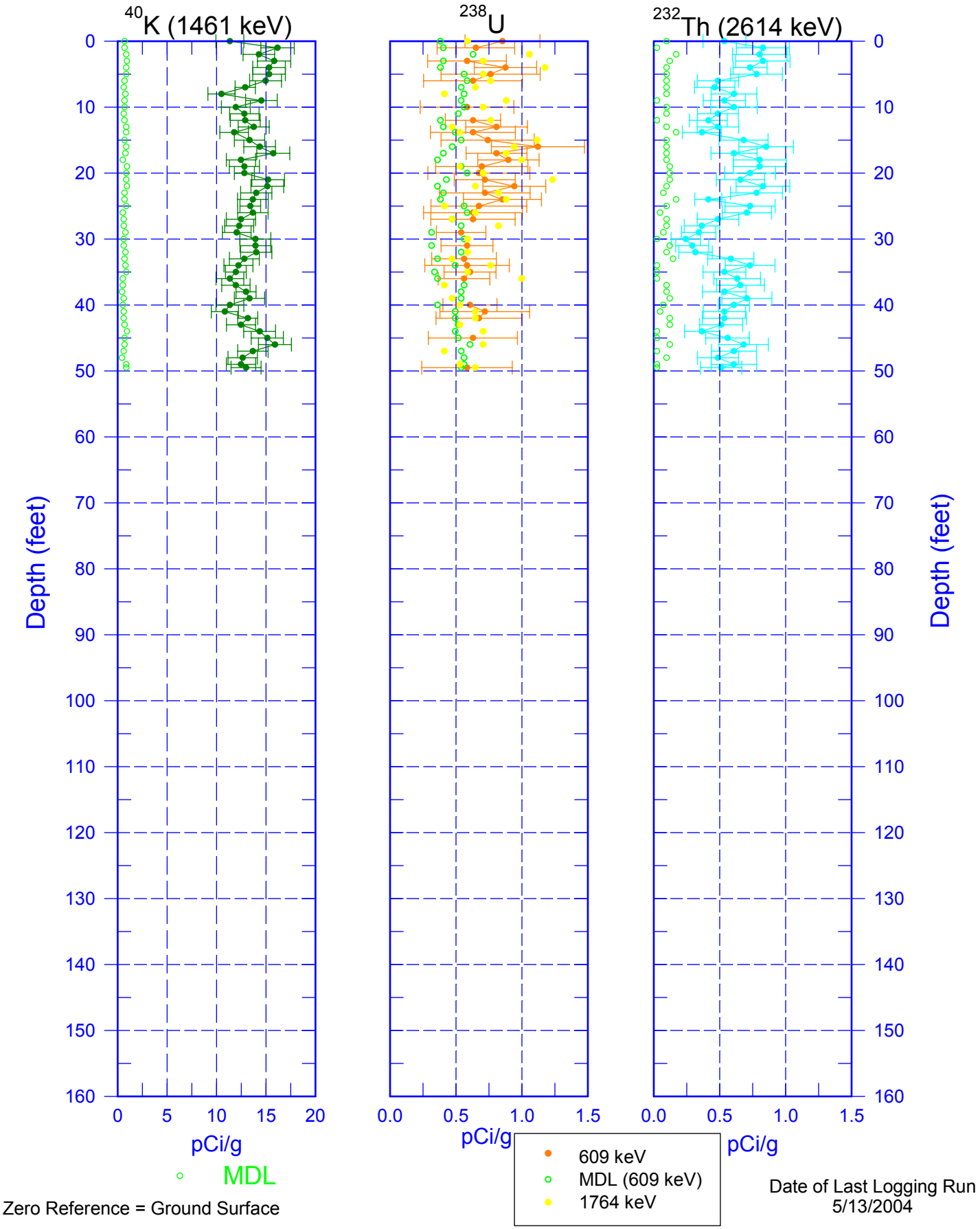
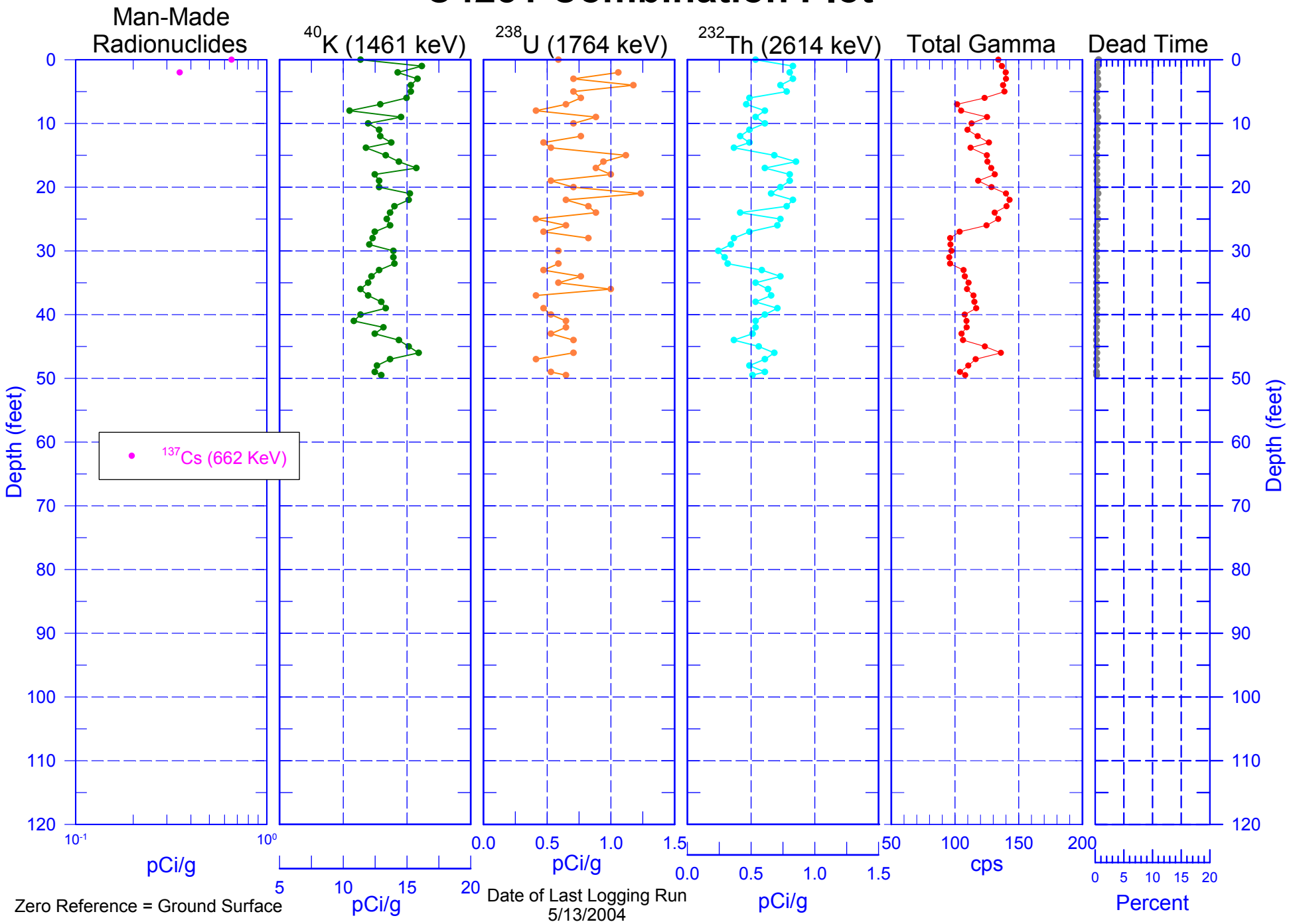
Natural Gamma Logs

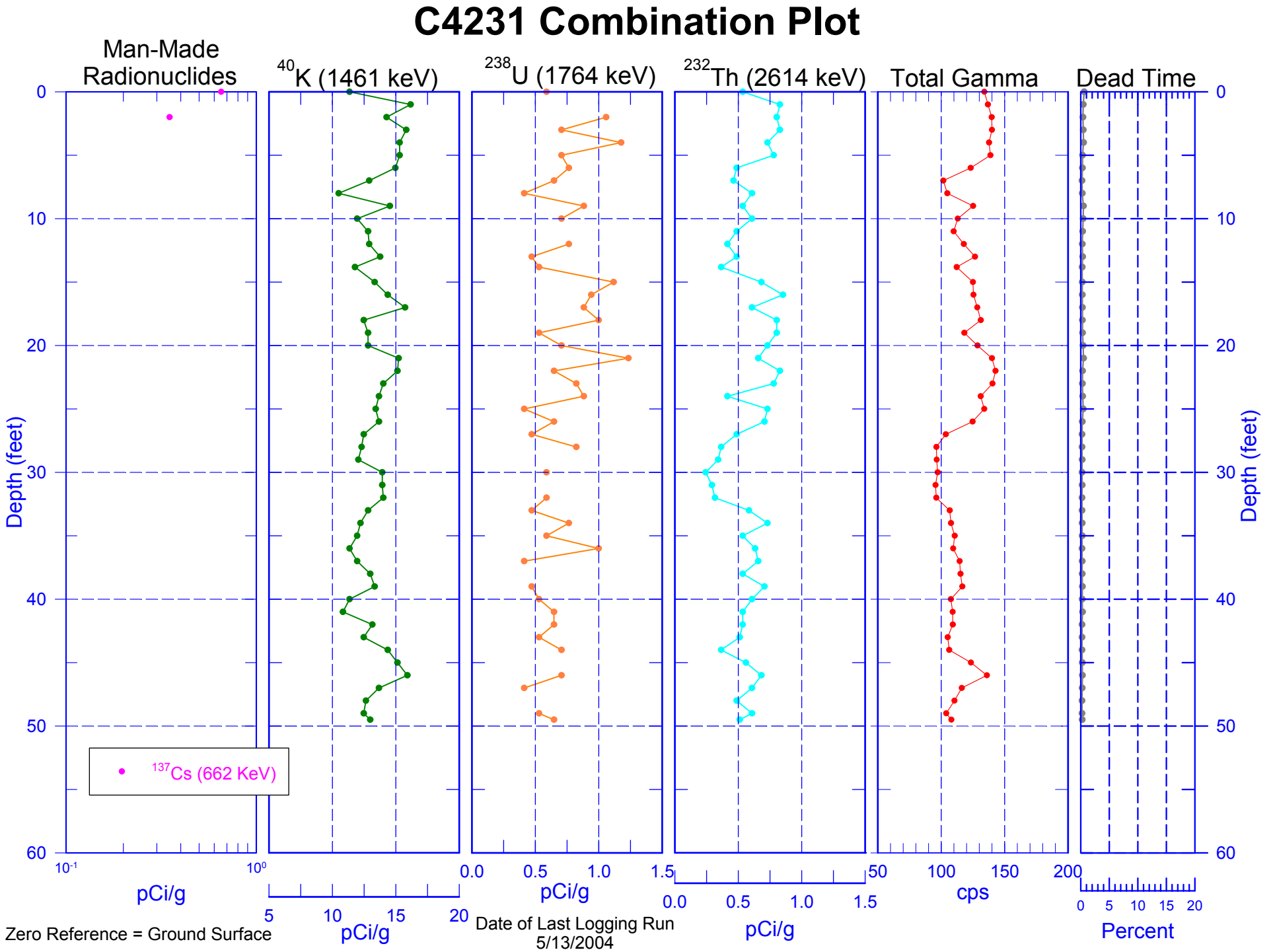


Zero Reference = Ground Surface

Date of Last Logging Run
5/13/2004

C4231 Combination Plot




C4231 Combination Plot
Man-Made Radionuclides
40K (1461 keV)
238U (1764 keV)
232Th (2614 keV)
Total Gamma
Dead Time
Depth (feet)
0
10
20
30
40
50
60
137Cs (662 KeV)
10-1
100
pCi/g
5
10
15
20
pCi/g
0.0
0.5
1.0
1.5
pCi/g
0.0
0.5
1.0
1.5
pCi/g
50
100
150
200
cps
0
5
10
15
20
Percent
Zero Reference = Ground Surface
Date of Last Logging Run
5/13/2004

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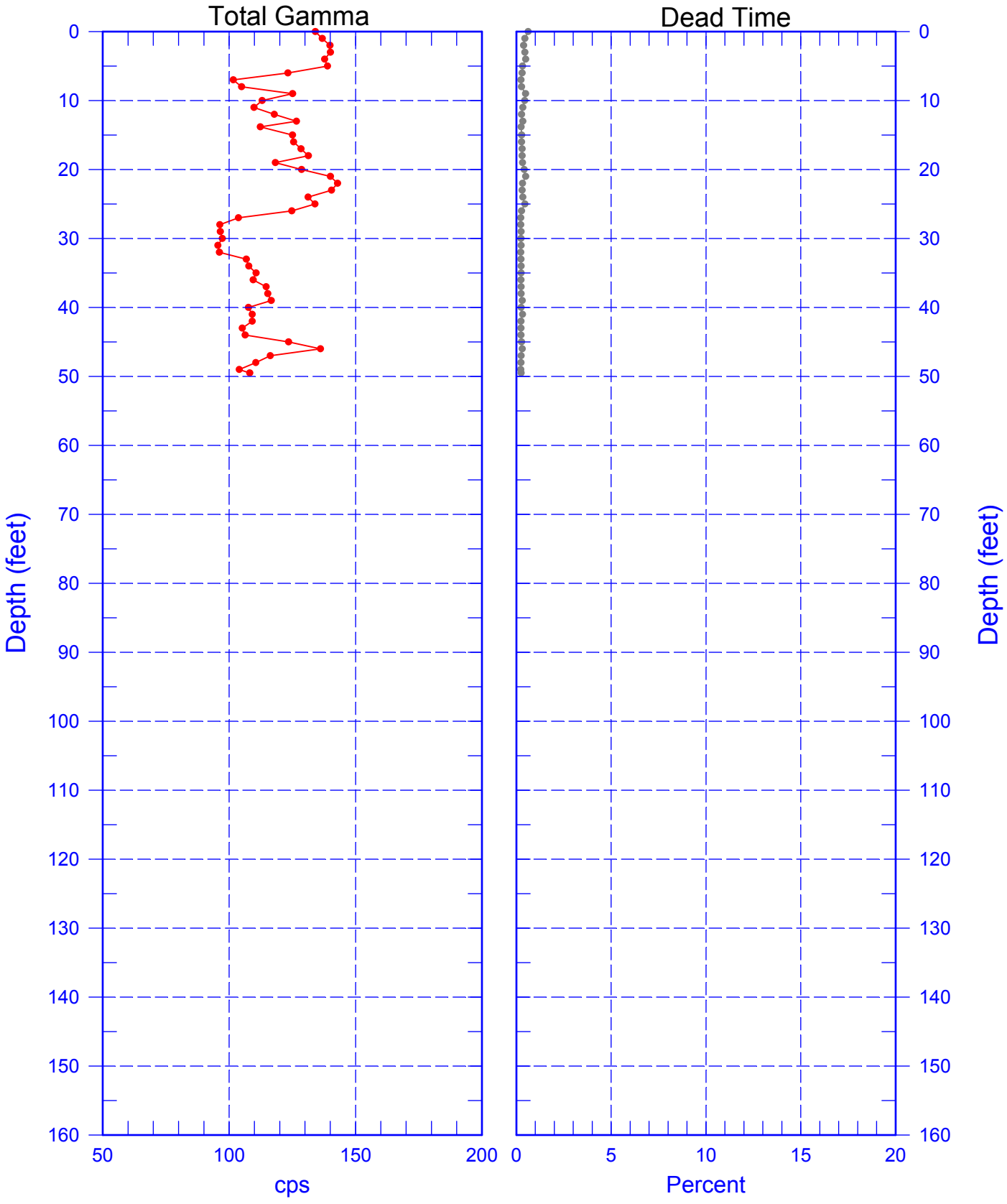
Total Gamma & Dead Time



Zero Reference = Ground Surface
Date of Last Logging Run
5/13/2004

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Rerun of Natural Gamma Logs (25.0 to 20.0 ft)